Evaluation of adult salmon passage behavior in relation to fishway modifications at The Dalles and John Day Dams

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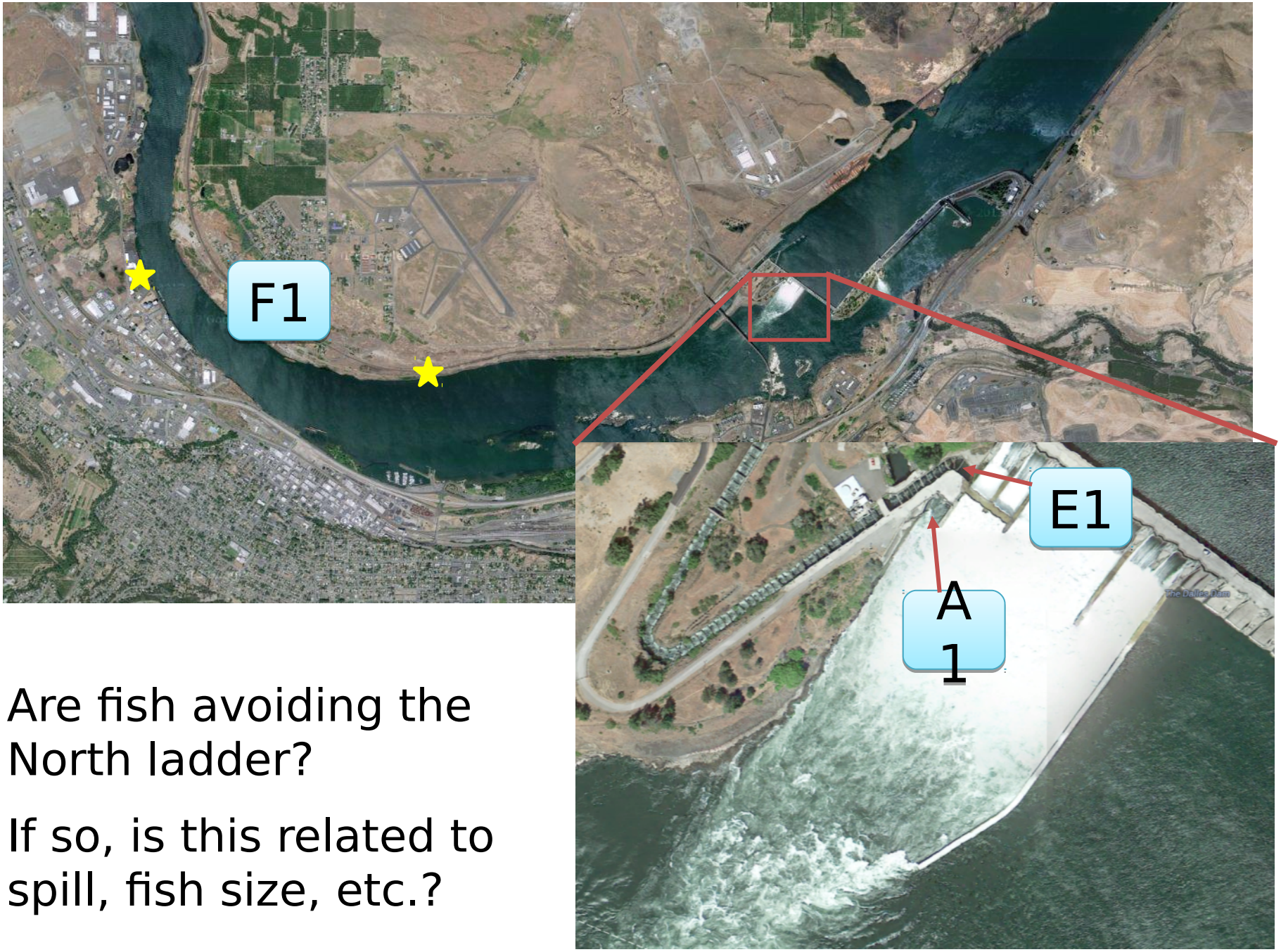
Outline

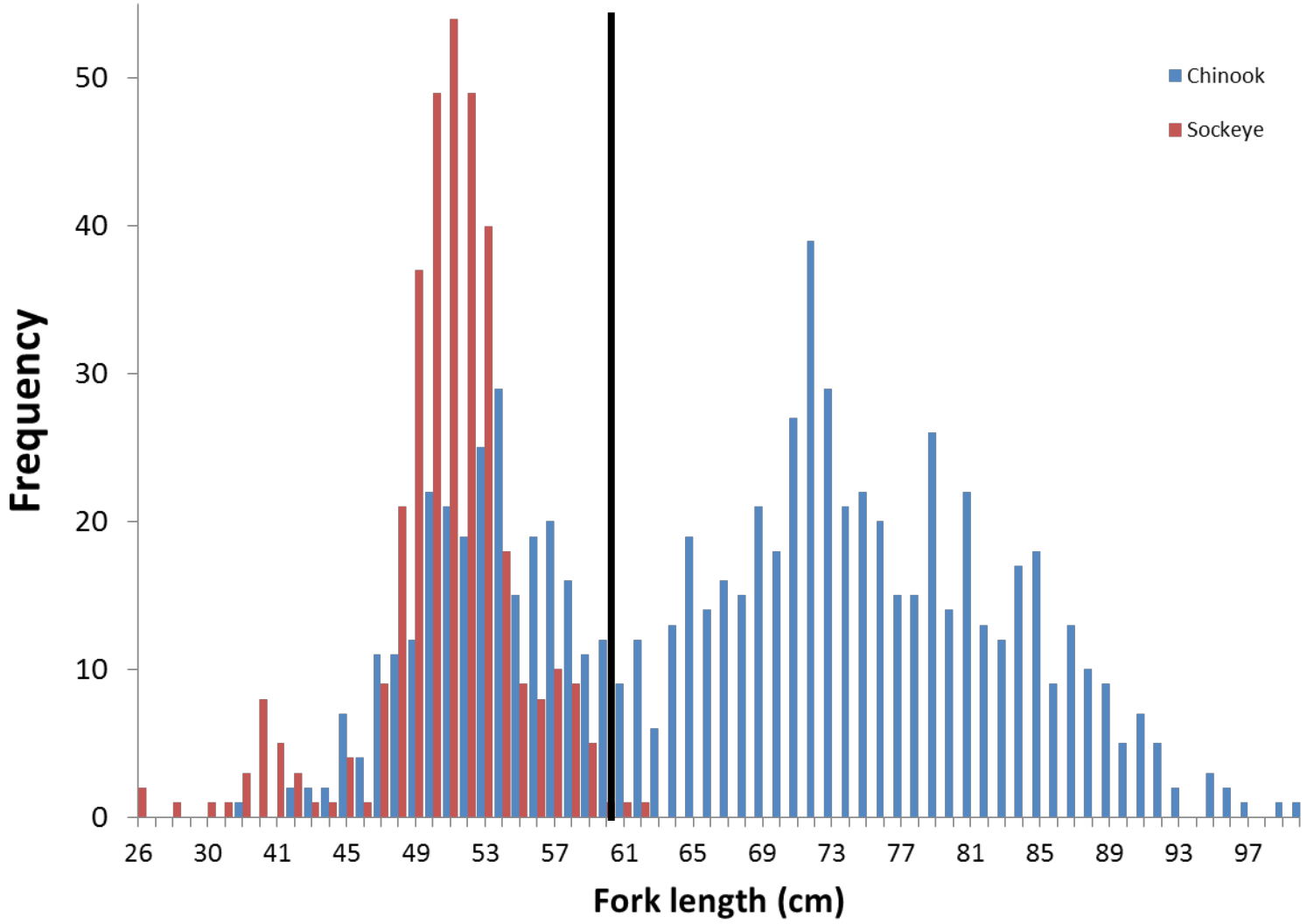
- The Dalles Dam
  - Ladder use
  - Side switching
- John Day Dam
  - Entrance efficiency and time

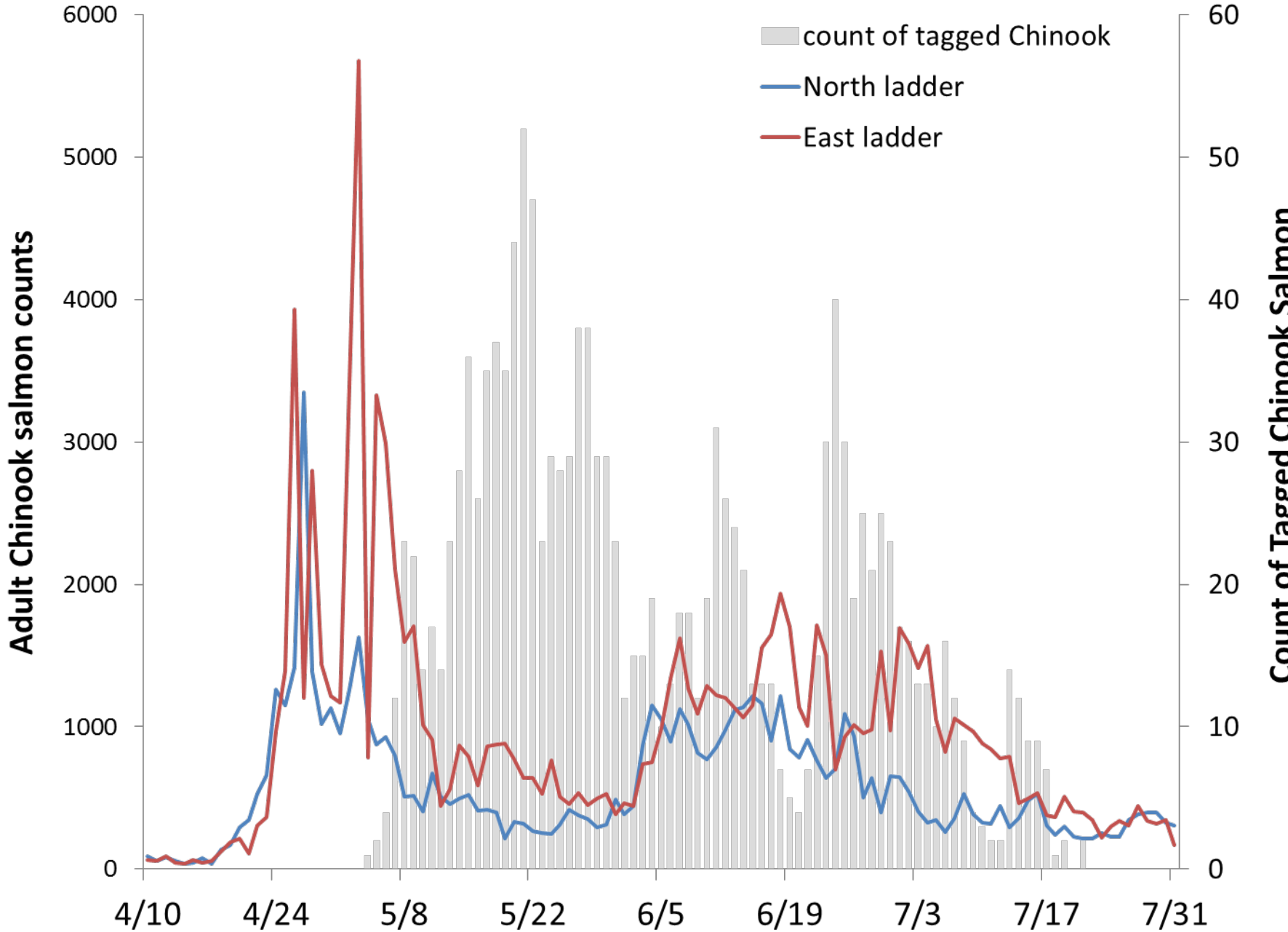


Are fish avoiding the North ladder?

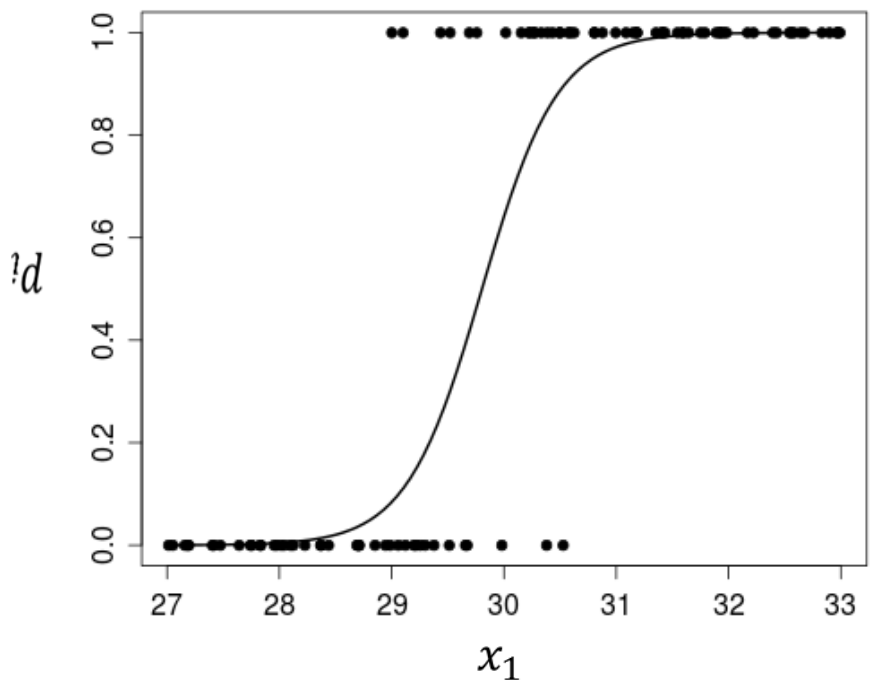
If so, is this related to spill, fish size, etc.?

Fork Length Distribution




count of tagged Chinook
North ladder
East ladder
Adult Chinook salmon counts
Count of Tagged Chinook Salmon
6000
5000
4000
3000
2000
1000
0
60
50
40
30
20
10
0
4/10
4/24
5/8
5/22
6/5
6/19
7/3
7/17
7/31

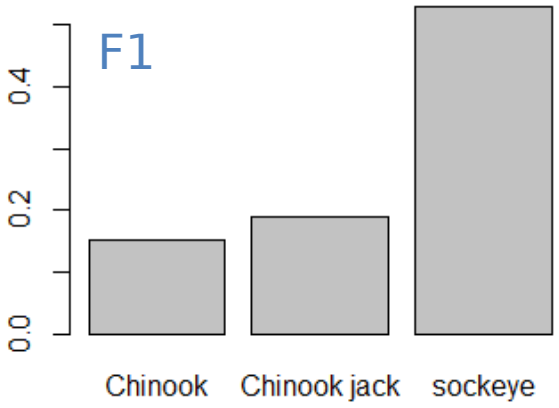
Logistic Regression

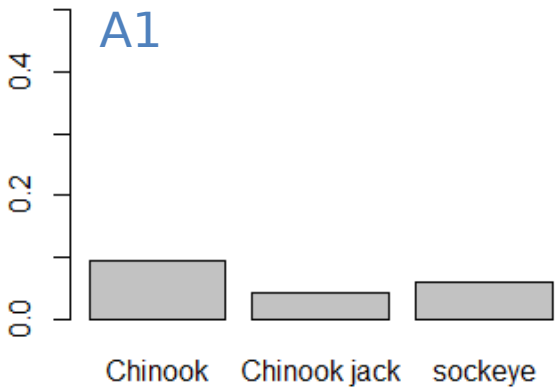


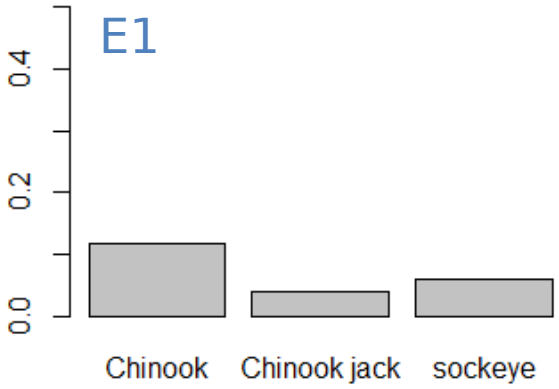
North Ladder

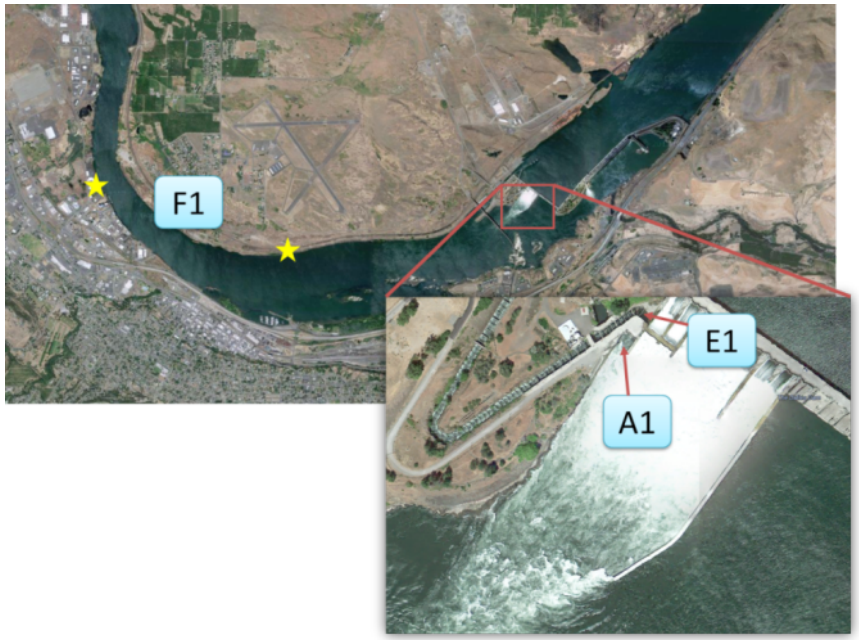
East Ladder

Probability of Using the North Shore/Ladder



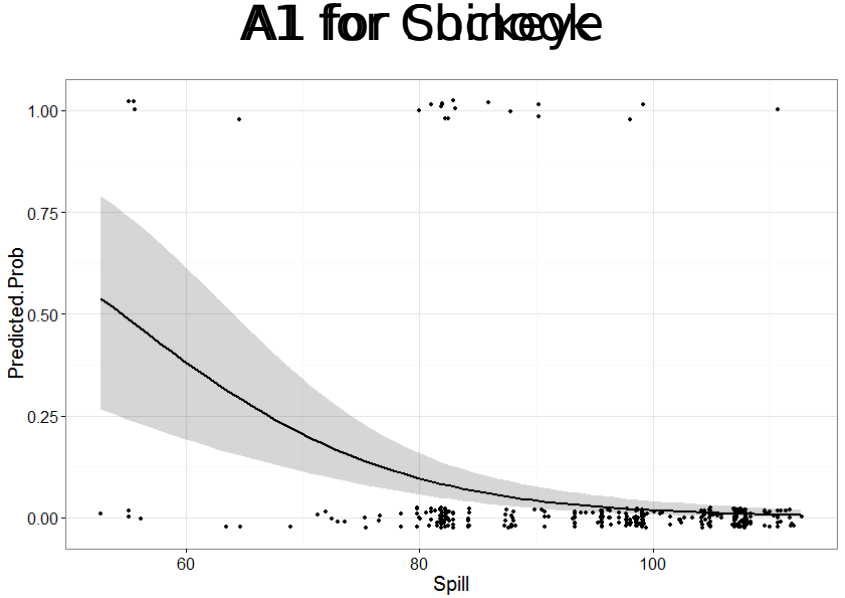


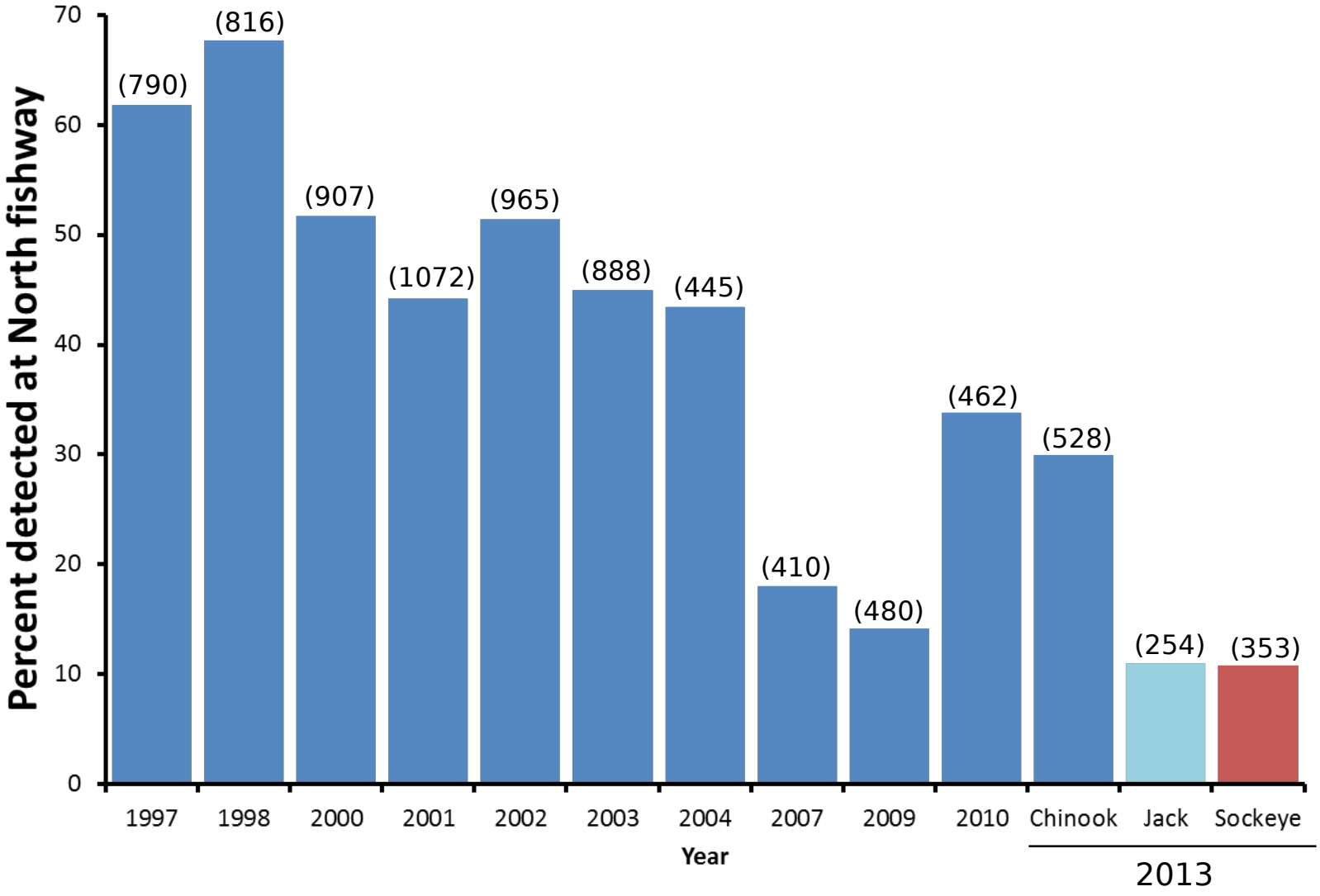




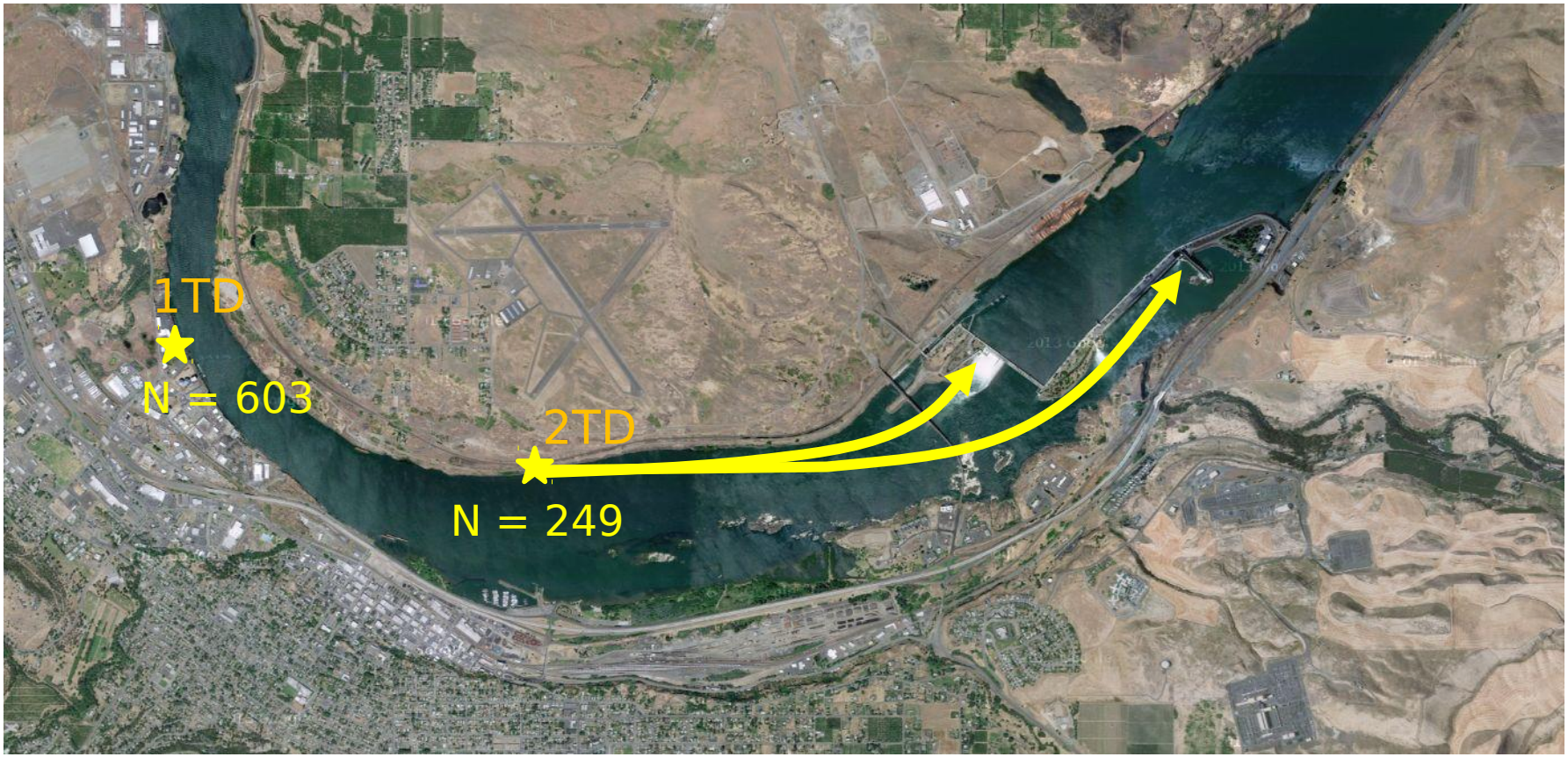
Probability of Using the North Shore/Ladder

		Chinook	Ch. Jacks	Sockeye
F1	Length (cm)	+5%	-	+6%
	Date (d)	+13%	+3%	-7%
	Temperature (°C)	-42%	-	+162%
	Spill (kcfs)	-	-	-
	Flow (kcfs)	+2%	-	+3%
	Dis. Gas (mmHg)	-	-	-
A1	Length	+4%	-	+21%
	Date	-	-	-
	Temperature	-	-	-
	Spill	-2%	-6%	-8%
	Flow	-		-
	Dis. Gas	-	-	-
E1	Length	+4%	-	+21%
	Date	-	-	-
	Temperature	+20%	-	-
	Spill	-	-	-
	Flow	-	-	-4%



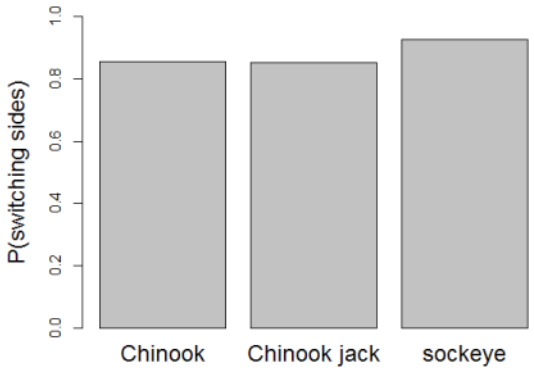

Percent detected at North fishway
70
60
50
40
30
20
10
0
(790)
(816)
(907)
(965)
(1072)
(888)
(445)
(410)
(480)
(462)
(528)
(254)
(353)
1997
1998
2000
2001
2002
2003
2004
2007
2009
2010
Chinook
Jack
Sockeye
Year
2013

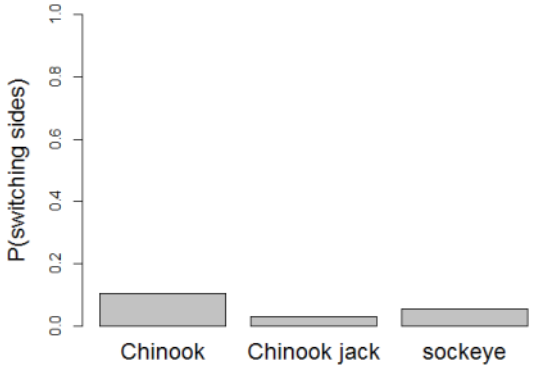
Side Switching



Logistic Regression

Probability of Switching Sides Between F1 and E1

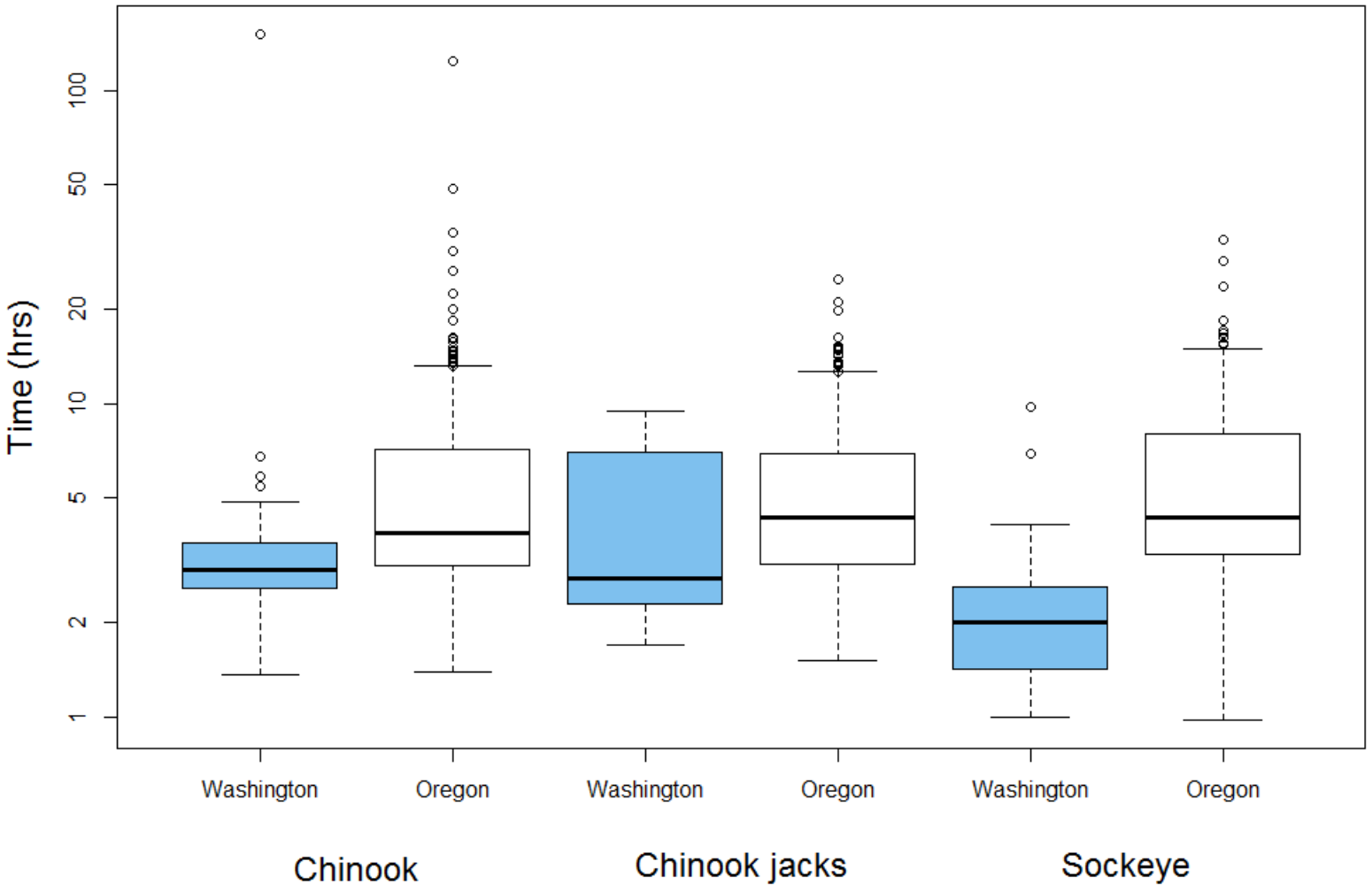




		Chinook (55)	Ch. Jacks (34)	Sockeye (160)
F1 in Washington	Length	-	-	-39%
	Date	-	-	-
	Dis. Gas	-	-	+7%
	Temperature	-	-	-
	Spill	-	+8%	-
	Flow	-	-	-

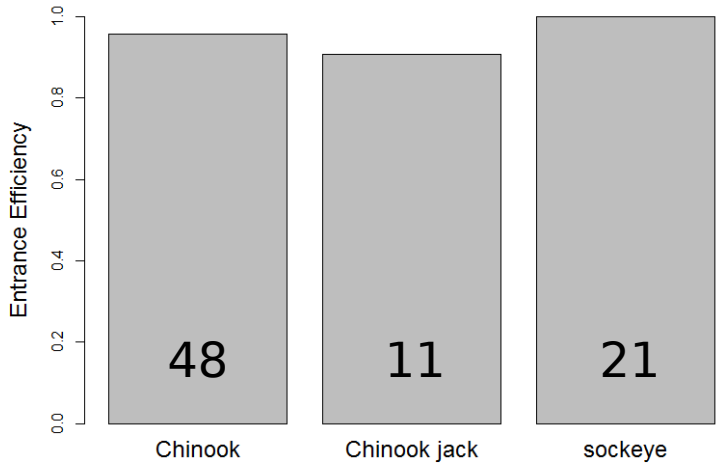
		Chinook (296)	Ch. Jacks (142)	Sockeye (144)
F1 in Oregon	Length	-	-	-
	Date	+3%	-	-
	Dis. Gas	-	-	-
	Temperature	-	-	-
	Spill	-	-6%	-12%
	Flow	-	-	-

Travel time from F1 to A1

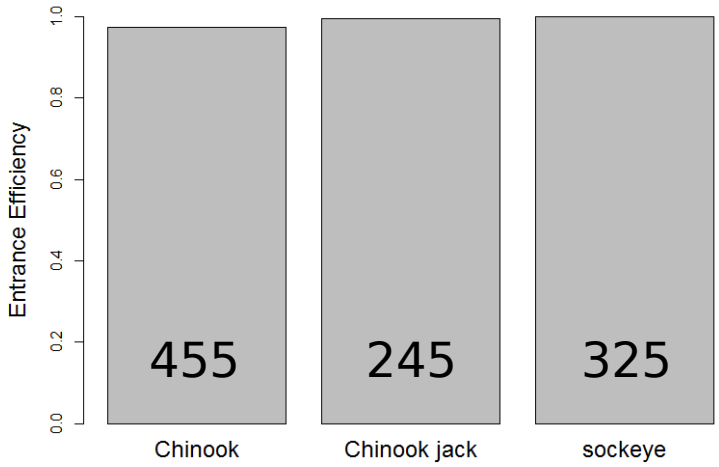


Entrance Efficiency

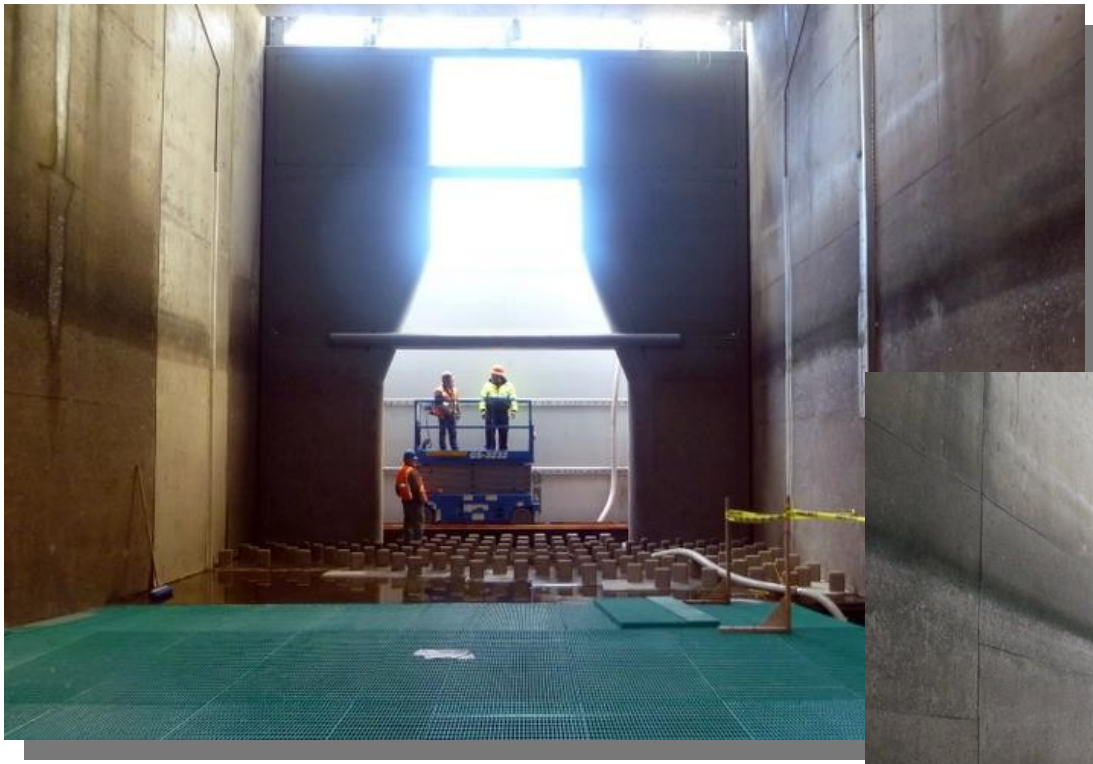
North Ladder

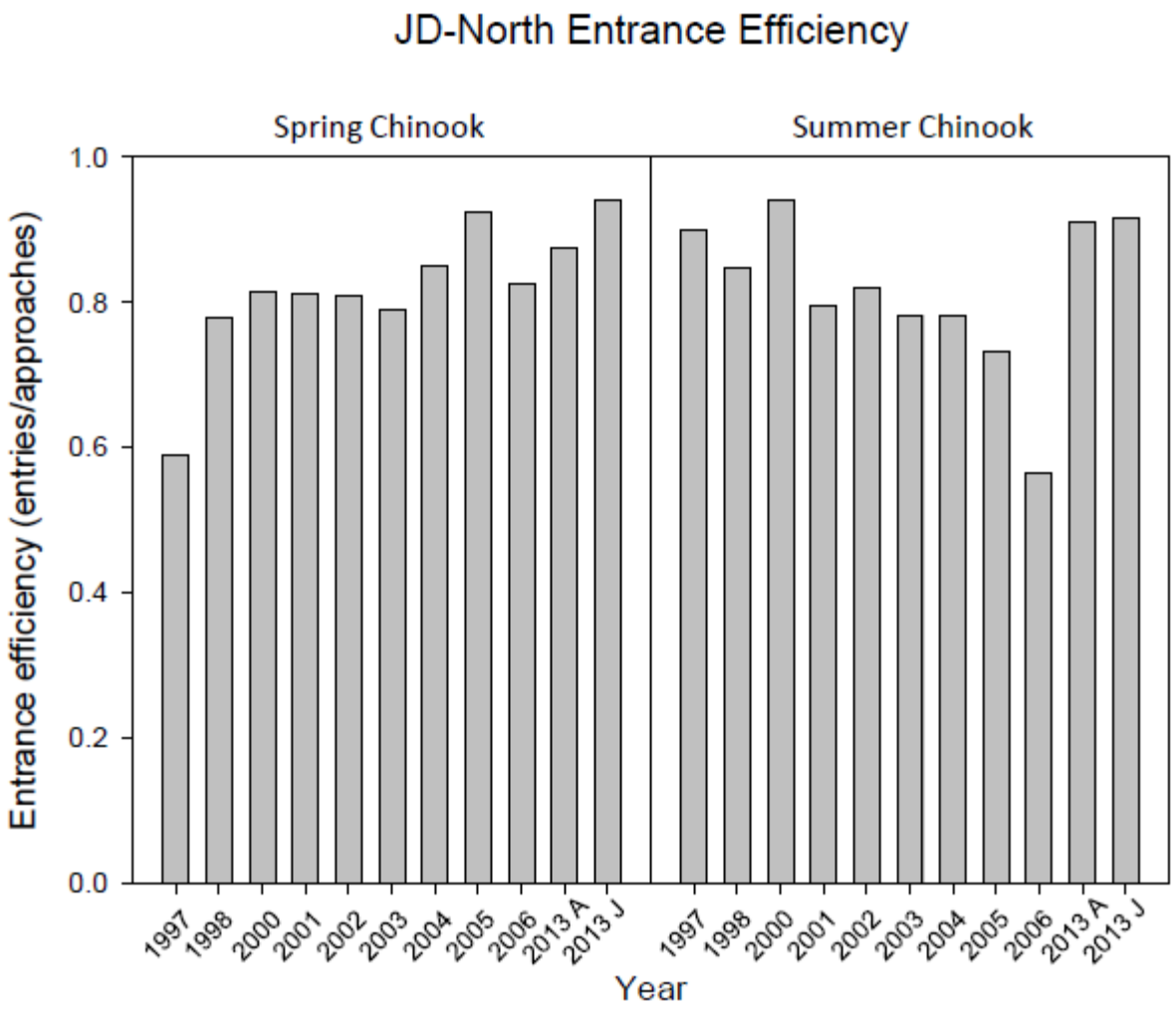


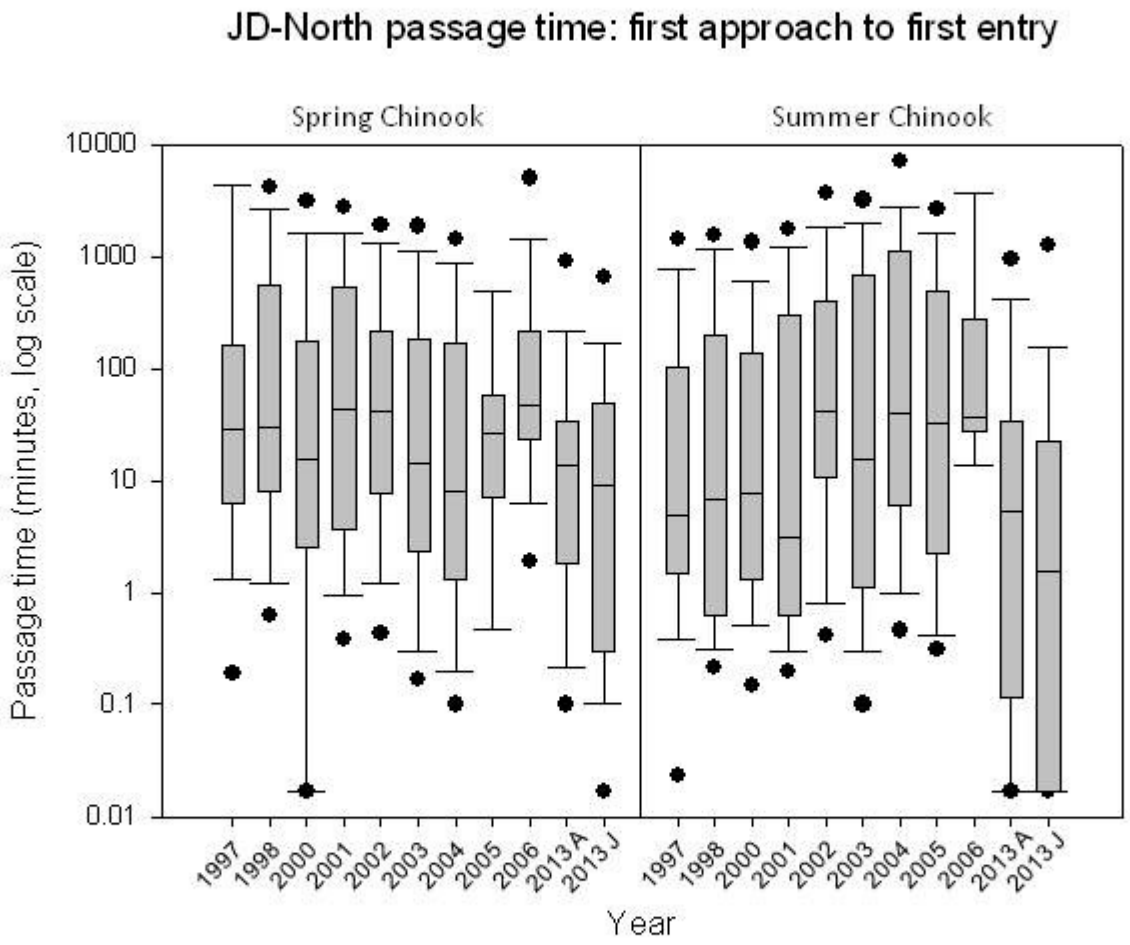
East Ladder



John Day Dam




JD-North Entrance Efficiency
Spring Chinook
Summer Chinook
Entrance efficiency (entries/approaches)
1.0
0.8
0.6
0.4
0.2
0.0
1997
1998
2000
2001
2002
2003
2004
2005
2006
2013 A
2013 J
Year


JD-North passage time: first approach to first entry
Spring Chinook
Summer Chinook
Passage time (minutes, log scale)
10000
1000
100
10
1
0.1
0.01
1997
1998
2000
2001
2002
2003
2004
2005
2006
2013 A
2013 J
Year

Summary

- The Dalles
  - Most Chinook use the south side of the river (downstream of The Dalles Dam)
  - Larger fish use the North side more than small fish
  - All are less likely to approach the North with higher spill
  - Fish switch sides – influenced by spill (jacks)
  - Approaching the North does not cause significant delays
- John Day